WORKING PAPER

Do Nominated Boundary Spanners Become Effective Technological Gatekeepers?

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ABSTRACT

In recent years, organizations have started formally assigning technical professionals to fill the role of technological gatekeepers. In this study we examine the effectiveness of nominating individuals to perform a similar "boundary-spanning" role between the Corporate Research Center of a major company and its operating units. We find that the attempt was partially successful in that those formally appointed had greater contact with the research center and were themselves more likely to utilize technology from the center. They were not successful, however, in transferring the center's technology to other members of the organization's technical staff.

INTRODUCTION

Many researchers have pointed out that the process of technology transfer can be facilitated by the presence of special liaison agents. These individuals operate either individually or as part of a group, who span the boundary between different organizational units. Quinn and Mueller (1963) have identified task-force groups, corporate development units, staff groups at corporate level, research groups with special budgets, and individual researchers who champion their ideas as some examples of organizational mechanisms that various companies have used for this purpose.

Other descriptions and classifications for this coordinating role also exist, but the underlying idea is the same. There is a need to integrate the values, roles, and perspectives of different functional divisions through some formal or informal mechanism to resolve differences and conflicts between them. According to Roberts and Frohman (1978), "...when a research result is to be transferred, movement of research personnel is a key factor in the project's survival through the torturous journey toward manufacturing or the market."

Allen (1984) has identified the boundary spanning role of the technological gatekeeper in the context of research, development, engineering and other technical functions. The gatekeeper is a <u>high technical performer</u> who connects an organization with outside sources of technology. The gatekeeper keeps abreast of new developments by

reading the more technically sophisticated literature and by communicating with external technical experts. Further, because of his proven technical competence he is frequently consulted on technical matters. As a result, the gatekeeper is a very effective channel for transferring technical information across organizational boundaries. Though the gatekeeper phenomenon was initially identified by Allen in the context of R&D project groups, the role definition in terms of information transfer has been extended and analyzed in other contexts (Roberts, 1978; 1987).

Tushman (1977), for example, extended Allen's gatekeeper concept by showing there are key individuals who span boundaries within as well as between organizations. These individuals perform the very important role of integrating very differentiated organizational units within an organization (Cf. Lawrence and Lorsch, 1967). It is this internal gatekeeper or boundary spanner who is the focus of attention in the present study.

There are several firms which, in recent years, have tried to gain full value from the gatekeeper role by identifying or designating engineers to perform the role. Since the gatekeeper role has traditionally been a naturally occurring, spontaneous phenomenon which develops informally among engineers and scientists, it is questionable whether the formal designation of such people will in fact enable them to perform in the desired manner.

In this study, we examine whether people in such formally

designated boundary spanning roles effectively fulfill their charter. Data for the study were gathered from five geographically separate operating regions of a large company in the energy resources industry. The company's Corporate Research Center (CRC) is responsible for developing and disseminating new exploration technologies to these operating units. To facilitate this transfer process at the operations level, each of the regions has a formally designated Technology Resource Group (TRG) whose members are charged with two tasks:

1) to act as internal consultants in solving technical problems and providing technical information, and

2) to act as a liaison with the Corporate Research Center by learning about technologies developed there and promoting their use by the regional geophysicists.

The members of the Technology Resource Group are the focus of our attention in their role as nominated boundary spanners. In this paper we identify the gatekeepers in the regions and examine the degree of overlap between Technology Resource Group membership and technological gatekeeping. We also discuss the factors that prevent or facilitate the emergence of nominated liaison agents as effective gatekeepers.

Profile of Technical Resource Group Members

Thirty-two technical professionals in the regions (out of a total of 282) are members of the Technology Resource Group. Since they are

charged with the task of communicating with the Corporate Research Center and promoting new technologies developed there among other regional scientists, it is important to see if they are successful in this liaison role. We will approach this issue from several angles, each touching on a different aspect of the boundary spanning function.

HYPOTHESES

Hypothesis 1: Communication with the Corporate Research Center.
In view of their assigned role, we would expect members of the Technology Resource Group to communicate more with the Corporate Research Center than do other scientists in the region. Therefore, we hypothesize that: Technology Resource Group members will report, on average, a greater number of communication partners in the Corporate Research Center than will scientists, who are not members of the Technology Resource Group.

Hypothesis 2: Visits to the Corporate Research Center.
The coordinating role calls for more interaction with the Corporate Research Center, which should result in Technology Resource Group members making more visits to the Corporate Research Center than other regional scientists. Therefore, we hypothesize that: Technology Resource Group members will report, on average, a greater number of visits to the Corporate Research Center over the preceding three-year period.

Hypothesis 3: Adoption of technologies.

We would expect the increased interaction with the Corporate Research Center to result in a greater likelihood of Technology Resource Group members implementing new technologies developed by the Corporate Research Center. Therefore, we hypothesize that: Technology Resource Group members will report, on average, a higher rate of implementation of Corporate Research Center-developed technologies than will other regional scientists.

Hypothesis 4: Attitudes regarding the Corporate Research Center.
Because of their greater exposure to the Corporate Research Center, one might expect Technology Resource Group members to hold more positive attitudes towards the Center. More specifically, we hypothesize that: Technology Resource Group members will, compared with other regional scientists, perceive Corporate Research Center work to be more relevant to the needs of the regions and Corporate Research Center research staff to be more approachable and more user-oriented.

Hypothesis 5: Communication with other scientists in the regions.
In view of their responsibility to provide a link between Corporate Research Center developments and regional activities, the Technology Resource Group members should establish a high level of communication with both Corporate Research Center staff and with colleagues in their regions. Therefore, we hypothesize that: Technology Resource Group members will, on average, report regular contact with a greatly number of colleagues in their regions than will scientists not assigned to the Technology Resource Group.

RESEARCH METHOD

The organization under study is a major company in the mineral exploration business. The technologies of interest are mostly in the nature of new techniques and methods for gathering, processing and interpreting seismic and other geophysical data to identify potential sites for active prospecting. Most of these methods are embodied as computer programs and packages. In addition to these software technologies, other output from the geophysics research group includes equipment for recording seismic data from potential sites.

The Geophysics Department of the Corporate Research Center has 75 research scientists. The potential users of the technologies from the Research Center are the geophysicists in seven exploration regions of the company. Three of these regions are located within the continental United States and the other four are at foreign locations.

Various technologies from the Research Center, as well as from other sources such as contractors and vendors, are used by the regional geophysicists in this process of transforming raw seismic data into maps which can be used for exploration decisions.

Design and Implementation of Regional Survey

From the perspective of a regional geophysicist, the role of the Research Center is to provide new technologies to improve the technical efficiency and effectiveness of the work. With this as a guideline, a

questionnaire was designed to collect data on them and other job-related variables. Specifically, the questionnaire sought data from the regional staff on the following categories of variables:

a) Demographic and job-related information: The questionnaires were anonymous. Respondents were informed that they did not have to provide their names so they would be willing to give their frank opinions about Research Center projects and scientists. However, data were gathered about their age, title, experience, education, etc.

b) Communication partners: Respondents were asked to name people in their region and at the Research Center with whom they discussed technical matters.They were asked to indicate the frequency of communication as well as how first contact was made with them.

c) Attitudes toward the Research Center: The questionnaire had a section with various statements about the relevance of Research Center projects to regional technical needs, the ease with which researchers could be approached and the timeliness of the research.

(d) Adoption of technologies: Data were collected on the number of new technologies that regional

people had adopted over the last three years from the Research Center and other sources. They were also asked to indicate the extent of their need for new technologies and the availability of time for tracking technical developments.

Copies of the questionnaire were mailed to 405 scientists in the regions. A total of 285 usable returns was received, yielding a response rate of 70 percent. There was very little regional variation in this response rate.

RESULTS

In many ways, it appears that the Technology Resource Group is accomplishing its intent. Members, who are working in geographically widely dispersed regions, have much greater contact with scientists in the Corporate Research Center. They are also more likely to make use of the technologies developed at the Corporate Research Center (Table I). This supports the first three hypotheses. Technology Resource Group members also report significantly more favorable attitudes toward the Corporate Research Center, giving evidence in support of the fourth hypothesis (Table II).

They believe the work of the Corporate Research Center to be more relevant and useful and the researchers there to be more approachable. They do not differ from non-members in the degree of user orientation

perceived among Corporate Research Center staff, however.

Technology Resource Group Effectiveness

At this point in the analysis, it appears that the Technology Resource Group is accomplishing its intent. Most of the hypotheses are supported. Technology Resource Group members report significantly higher contact with Corporate Research Center

Table I

Comparisons Between Scientists Who Are Members of the Technology Resource Group and Those Who Are Not

	Mean Value for:		
	Members of TRG	Non-Members	p
Number of reported communication partners at the Corporate Research Center.	1.70	0.70	0.001
Proportion reporting at least one Research Center contact in preceding year.	69%	32%	0.001
Visits to the Research Center in preceding year.	2.5	1.3	0.002
Mean number of instances of technology adoption in preceding three years.	1.60	0.70	0.001
Proportion reporting adoption of a technology developed at the Research Center.	72%	37%	0.001

Table II

Attitudes of Scientists in the Exploration Regions Toward the Corporate Research Center

	Mean Factor Score for:		
	Members of TRG	Non-Members	p
Relevance and utility of Research Center work.	**0.68**	-0.09	0.001
Approachability of Center scientists.	0.54	-0.07	0.002
User-orientation of Research Center scientists.	0.36	-0.05	0.06

staff. They are more likely to adopt technology developed at the Corporate Research Center and have a generally more favorable attitude toward the Corporate Research Center.

There is still one very important link that is missing, however, Comparing Technology Resource Group members with non-members in their contact with regional colleagues (Table III) shows that they do not differ significantly in this critical measure. The results thereby fail to support hypothesis five.

Table III

Regional Contacts Reported as a Function of Technology Resource Group Membership		
Mean Number Reported by:		
Members of TRG	Non-Members	p
3.3	3.1	N.S.

Transfer of Technology Beyond the Membership

To link effectively the exploration regions with the Corporate Research Center, the Technology Resource Group members must pass their knowledge of Corporate Research Center technology on to colleagues within the region. Here is where the system breaks down. Scientists, who are not members of the Technology Resource Group are no more likely to have learned of Corporate Research Center technology through a Technology Resource Group member than to have learned of it directly (Table IV).

Table IV

Adoption of Research Center Technologies by Scientists Who Are Not Members of the Technology Resource Group

	Scientists Who Report:		
	Contact With At Least One TRG Member	No Contact With TRG Members	p
Proportion reporting adoption of at least one Research Center technology in preceding three year period	34%	39%	N.S.
Mean number of technologies adopted	0.66	0.75	N.S.

DISCUSSION AND CONCLUSIONS

These results emphasize a very important point, which must be taken into account in any attempt to formalize the boundary-spanning or gatekeeping roles. There are two entities that must be connected. First there is the source of technology. That is some organizational unit (the Corporate Research Center in this instance) for the boundary-spanner or external technology for the gatekeeper. However, there are also the intended recipients or users of the technology, i.e. the boundary-spanner's colleagues within the organization. Unless the technology reaches and is used by these people the boundary spanning role is not being performed.

In the present instance, the formation of the Technology Resource Group was successful in stimulating contact between its members and the staff of the Corporate Research Center. It even resulted in improved perceptions of the Corporate Research Center and a higher use of Corporate Research Center technologies by Technology Resource Group members.

Where the Technology Resource Group failed, however, was in the link to other technical staff within the regions. Appointing someone to a role such as Technology Resource Group member may stimulate that person to increase their contact with technology sources (in this case, the Corporate Research Center). It will not, however, necessarily increase that person's contact with other colleagues. Such contacts are more likely to result from choices made by those other colleagues, who seek technical information. Membership in a formal group such as the Technology Resource Group is not the criterion that they will use in making this choice. More likely, they will turn to those individuals, whom they see as having the necessary information, of being more competent in the particular technical area in which information is sought. This is why gatekeepers have universally been found to be high technical performers (Allen, 1984). It is the perception of competence or high performance that attracts the contact from colleagues, not the formally appointed role.

That does not mean that formal appointment will always produce the sort of results reported here. This organization may just have chosen the wrong people for Technology Resource Group membership. They were

successful in linking those people to the Corporate Research Center; perhaps if they had chosen the true high performers or 'stars' from the regions, they would also have been able to accomplish their ultimate purpose of linking the average member of the regional staff to the work of the Corporate Research Center.

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